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Fiscal Policy and Monetary Integration in Europe: An Update

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Abstract

By distinguishing between discretionary and non-discretionary fiscal policy, this paper analyses the stability of fiscal rules for EMU countries before and after the Maastricht Treaty. Using both Instrumental Variables and GMM techniques, it turns out that discretionary fiscal policy has remained procyclical after 1992. This result contradicts the previous findings of Galí and Perotti (2003). It also appears that fiscal rules differ between large and small countries; large countries follow a procyclical discretionary policy. Furthermore, the paper shows that discretionary fiscal policy exhibits different behaviour when facing supply or demand constraints. A procyclical discretionary policy is followed mainly during upswings, when supply constraints are prevalent. Finally, there is no support for the presence of a 'fatigue effect' in fiscal discipline.

Keywords: discretionary fiscal policy; demand and supply constraints; Maastricht Treaty
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1 Introduction

Fiscal arrangements, which have been settled during the European integration process, undoubtedly constitute the most criticized part of the European Monetary Union (EMU). Even if they aim at increasing real convergence among member countries, they are occasionally perceived among national politicians and European citizens as an unacceptable dictate from authorities in Brussels that removed the possibility of fiscal expansion in the face of recessions. In other words, by imposing fiscal rules in the Maastricht Treaty or the Stability and Growth Pact, fiscal policy would have lost its counter-cyclical role and thus, the stabilizing effect it used to play in the past.

Empirical studies that have tried to find support for the changing cyclical behaviour of fiscal policy during the European integration process have failed to come to a clear-cut corroboration, and some even endorsed the fiscal manoeuvring room introduced by the Maastricht Treaty and the Stability and Growth Pact (see Wyplosz (2006) for a survey). In this respect, the paper by Galí and Perotti (2003) (GP hereafter) constitutes a widely cited example. GP systematically distinguished between discretionary and non-discretionary fiscal policy in their analysis. In the first case, the variable of interest is the structural deficit, corrected for cyclical fluctuations. Any change in the public deficit indicates discretionary policy. The non-discretionary part of the fiscal deficit then encompasses the automatic stabilizing effects due to business cycle fluctuations. For example, the public deficit tends to be automatically reduced during upward phases of the cycle because of an increase in fiscal income.

GP investigated the stability of both components of fiscal policy before and after the signature of the Maastricht Treaty in 1992 through the estimation of a fiscal-rule equation for the period 1980 – 2002. As might be expected from the automatic stabilizer effects, non-discretionary fiscal policy clearly showed a counter-cyclical behaviour in the pre-Maastricht period, which increased even after the Maastricht Treaty. Concerning the discretionary part, GP found that fiscal policy was procyclical in the pre-Maastricht period, but in the post-Maastricht period this changed to counter-cyclical behaviour. GP therefore concluded that the Maastricht Treaty and the Stability and Growth Pact supported the implementation of fiscal policy in the constituted EMU, instead of being a restraint.

This presence of a significant break in 1992, as well as the procyclical pattern of discretionary fiscal policy prior to Maastricht, though acyclical thereafter, has been confirmed by Wyplosz (2006, Table 2) using more recent data and similar estimation procedures. Von Hagen (2006, Table 6) found that discretionary policy has remained procyclical after Maastricht, but this conclusion is subject to caution as it is based on pooled OLS estimation, which may be biased, as we will argue below (in line with GP).[1] Fatás and Mihov (2003a) stressed that the Stability and Growth Pact in its various guises has provided protection against the undesirable consequences of policy discretion by introducing constraints on deficit policy. They concluded that the Pact has indeed been successful in reducing deficit volatility, in particular, for discretionary policy. However, they also observed "fatigue in the process of fiscal adjustment. Once countries have moved into the safe area below the 3 per cent limit, the pressure to continue towards the goal of close to balance or surplus is much weaker..." (p. 121). Finally, an interesting observation by many authors is that elections had an impact on fiscal behaviour, consistent with the notion of a political business cycle (De Haan et al., 2003; Annett, 2006; Von Hagen, 2006; Hallerberg et al., 2007).

This paper extends the GP study to more recent years, since GP was based on OECD Economic Outlook data covering only the period 1980-2002.[2] Extending the sample for the period 2002–2004 provides additional information and removes the problem of data revision, which affected the observations used by GP. Comparing the results of the estimation for the periods 1980 – 2002 and 1980 – 2004, it turns out that contrary to GP and Wyplosz (2006), discretionary fiscal policy is consistently procyclical over the sample. Furthermore, fiscal policy has not become less procyclical after Maastricht; adding data for the last two years indicates even greater procyclical behaviour of discretionary fiscal policy. Hence, the fiscal arrangements induced by EMU have in no manner constituted an ease, but instead have provided less room for effective discretionary fiscal policy. Contrary to GP, our conclusion supports the uneasy feeling

[1] The same holds for the estimations by Fonseca Marinheira (2005).

[2] Several studies have advocated the use of real-time data to judge the pro- or counter cyclicality of fiscal policies, by using only information actually available to policymakers at the time they make their decisions – e.g., Forni and Momigliano (2004) and Golinelli and Momigliano (2006). However, the availability of real time data is limited. Moreover, the objective of this paper is to evaluate *actual* fiscal policy conducted by EMU governments, and eventually governments are judged on their ex-post performance.

among various European politicians. Concerning non-discretionary fiscal policy, the enlarged sample confirms the stabilizing role of automatic stabilizers, which have played an increased role since 1992, as predicted by economic theory (Wren-Lewis, 2000; Fatás and Mihov, 2003b).

In our analysis, we find also strong indications of country heterogeneity. Following the literature, we distinguish between different fiscal polices for large and small countries. We conclude that small countries have more acyclical discretionary fiscal policies, as expected. The large countries exhibit a different behaviour, as they tend to support a procyclical discretionary fiscal policy, without any break in 1992. This small versus large country heterogeneity is not found in the case of non-discretionary fiscal policy, which is counter-cyclical regardless of the country and the sample considered.

To complement the analysis, we also separately investigate the reactions of discretionary and non-discretionary fiscal policy to supply and demand shocks. To this aim, we use survey information on demand and supply constraints issued from the European Commission's Business and Consumer Survey, EU (2006). It turns out that the procyclical bias of discretionary fiscal policy is most prevalent under supply constraints, i.e., during the upswing, which is consistent with our earlier findings. Such a result constitutes a striking stylized fact. In line with Kostoris Padoa Schioppa (2006), we also expect a clear distinction between large and small countries in fiscal policy behaviour. It turns out that large countries indeed react strongly to supply constraints by increasing the discretionary deficit, and react to demand constraints by decreasing the deficit. Small countries, on the other hand, show no reaction to these constraints in their discretionary fiscal policy.

The plan of the paper is as follows. In Section 2 we review the GP methodology and show that the results of the fiscal rules differ for an extended sample period. Since we also observe the presence of country heterogeneity, we further investigate the presence of heterogeneity by differentiating between large and small countries in Section 3, and show that country heterogeneity indeed plays a role. Finally, in Section 4 we investigate whether the observed differences in countries' reactions can be explained by differences in demand and supply constraints; this turns out to be the case to a limited extent. However, we generally find an asymmetric reaction of discretionary fiscal policy to demand and supply constraints. Conclusions are drawn in Section 5.

2 Have discretionary and non-discretionary fiscal policies changed since Maastricht?

In line with GP, most researchers that have investigated the behaviour of fiscal policy have based their analysis on a fiscal rule. The simple link between a budget deficit (d_t) and the output gap (gap_t) can be specified as follows:

$$d_t = c + a_1.gap_t + \varepsilon_t, \tag{1}$$

where ε_t is white noise. Nevertheless, this over-simplified fiscal rule suffers from several specification and estimation problems. First, it does not take into account the possible dynamics. of the budget deficit. For instance, a country facing a huge deficit and a high debt level has less room for a new expansionary fiscal shock and will tend to be more restrictive for the coming fiscal exercise. As a consequence, one might expect that the fiscal impulse at time t depends on the past public deficit (d_{t-1}) and the past stock of debt (b_{t-1}). Second, there is a potential simultaneity bias between public deficit (d_t) and the output gap (gap_t). For this reason, GP rightly rejected the use of a simple (pooled) OLS–estimator and applied an IV–estimator. However, Arellano and Bover (1995) showed that a GMM estimator based on orthogonal deviation might perform better than an IV-estimator in the case of a dynamic panel model. Nevertheless, the relative properties of the IV and GMM estimators remain debatable in the econometric literature[3], and thus we decide to report the results obtained by both methodologies.

We follow common practice by using a fixed-effects panel data analysis to estimate a fiscal rule for a group of countries. Our model consists of the following fiscal rule:

$$d_{i,t} = c_i + a_1.E_{t-1}(gap_{i,t}) + a_2.d_{i,t-1} + a_3.b_{i,t-1} + u_{i,t}, \tag{2}$$

where i refers to the country dimension and $E_{t-1}(gap_{i,t})$ is approximated by $gap_{i,t}$.

[3] Harris and Matyas (2004) compared the Arellano-Bover (1995) approach to different IV specifications, showing that the respective properties of these estimators depend on several factors. In particular, they showed by simulations that when the sample size is finite, GMM may be biased as it considers large instrument matrices.

When estimating the fiscal rule using a fixed effects Instrumental Variables (IV) estimator, we follow GP and instrument $gap_{i,t}$ by the lagged output gap of the country itself, $gap_{i,t-1}$, and the lagged US output gap, $gap_{US,t-1}$. Following the original Arellano-Bover GMM methodology, we do not use lags of the exogenous variables as instruments with GMM, but instead use lags of the dependent variable in the instrument space (Harris and Matyas, 2004). Therefore, the instrument space consists of up to two lags of the dependent variable, $d_{i,t-2}$ and $d_{i,t-3}$,[4] and in line with GP we also add the lagged US output gap ($gap_{US,t-1}$). The adequacy of the instruments is tested via the traditional Sargan test, which confirms our choice of the instrument set. To obtain a robust standard error, the White period correction is applied.

To investigate whether a changing behaviour in the fiscal policy occurred after the Maastricht Treaty, the coefficients are allowed to take a different value in the periods before and after the Treaty, i.e., in the periods 1980 – 1991 and 1992 – 2004. The choice of 1992 as a known break date is strongly motivated by economic facts, namely the year of the signature of the Maastricht Treaty. Moreover, considering the break date as unknown and using traditional stability tests in the GMM framework (Hall and Sen 1999) would lead to huge confidence bounds, as the sample is of finite size (21 observations). Unambiguously, the presence of a break in 1992 would not be rejected at the 95% confidence interval.[5] Equation (2) then is rewritten as follows:

$$d_{i,t} = c_i^{BM} + c_i^{AM} + a_1^{BM}.E_{t-1}(gap_{i,t}) + a_1^{AM}.E_{t-1}(gap_{i,t}) + a_2^{BM}.d_{i,t-1} + a_2^{AM}.d_{i,t-1} + a_3^{BM}.b_{i,t-1} + a_3^{AM}.b_{i,t-1} + u_{i,t}, \quad (3)$$

where a^{BM} and a^{AM} refer to the value of the coefficient during the pre and post-Maastricht periods, respectively. In the case of an unchanged behaviour of fiscal policy after the Treaty, it should be noticed that $a_1^{BM} = a_1^{AM}$ can be tested via a simple F–test. A comparison of the values of the coefficients a_1^{BM} and a_1^{AM} would indicate if the ease of the fiscal policy has improved or not. In the case that the absolute value of a_1 has

[4] Due to the nature of the panel, small N and large T, it is not feasible to use the entire instrument space composed of all lags of the dependent variable.

[5] A formal test is beyond the objective of the paper and is left for further research. Nevertheless, a quick investigation considering recursive candidate break points indicates that the coefficients before and after 1992 are significantly different. Moreover, the t-statistics are maximal for a break in 1992.

increased, this indicates a stronger counter-cyclical behaviour when $a_1 < 0$ or a stronger procyclical behaviour when $a_1 > 0$.

The proxy for fiscal policy is the budget deficit. As in GP, both the actual (d_t) and the structural budget deficit (d_t^*) are considered in our study. The variable d_t^* indicates the discretionary changes in fiscal policies due to the decision of fiscal authorities, whereas the variable $d_t - d_t^*$ represents the non-discretionary fiscal policy as it may be subject to changes that are not under the control of the fiscal authorities. An example of this "automatic stabilizing" effect is the reduction of the budget deficit during upward movements of the business cycle.[6] As activity is booming and the positive output gap increases, tax income automatically rises, reducing the budget deficit without any action of fiscal authorities. To remove business cycle movements and to have an adequate proxy of the discretionary action of the fiscal authorities, the OECD has constructed data on a structural public deficit.[7] The discretionary and non-discretionary fiscal rules have the following forms:

$$d^*_{i,t} = c_i^{BM} + c_i^{AM} + a_1^{BM}.E_{t-1}(gap_{i,t}) + a_1^{AM}.E_{t-1}(gap_{i,t}) + a_2^{BM}.d^*_{i,t-1} + a_2^{AM}.d^*_{i,t-1} + a_3^{BM}.b_{i,t-1} + a_3^{AM}.b_{i,t-1} + u^*_{i,t}, \quad (4)$$

$$d_{i,t} - d^*_{i,t} = c_i^{BM} + c_i^{AM} + a_1^{BM}.E_{t-1}(gap_{i,t}) + a_1^{AM}.E_{t-1}(gap_{i,t}) + a_2^{BM}.(d_{i,t-1} - d^*_{i,-1t}) + a_2^{AM}.(d_{i,t-1} - d^*_{i,-1t}) + a_3^{BM}.b_{i,t-1} + a_3^{AM}.b_{i,t-1} + u_{i,t}. \quad (5)$$

A negative sign of a_1 indicates a counter-cyclical policy, whereas a positive sign points towards a procyclical policy.

We present the estimation results of the discretionary fiscal rule on the pre- and post-Maastricht period for a set of 11 European countries in Tables 1 and 2, respectively.[8] In Table 3, we report on the non-discretionary fiscal rule. Annual data over the period 1980 – 2004 are extracted from OECD (2006). The output gap ($gap_{i,t}$) is defined as the

[6] In line with the literature, we concentrate on the *primary* government deficit, i.e., excluding interest payments on government debt. The motivation to do this is that the latter are neither discretionary nor automatic stabilizers, whereas the discussion focuses on the interaction between discretionary policy and automatic stabilizers.

[7] See the Appendix for data sources.

[8] The countries are Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal, and Spain.

relative deviation of the gross domestic product from the potential output defined by the OECD.[9] As in GP, the pre-Maastricht period corresponds to 1980 – 1991, whereas we consider two different post-Maastricht samples: the same as in GP, i.e., 1992 – 2002, and an extended sample running from 1992 to 2004. We found that although the first sample period is identical to that used in GP, our more recent data are somewhat different because of the revision process; it takes more than one year before the OECD produces its definitive data.[10] Furthermore, we have no reason to believe that the sales of Universal Mobile Telecommunications Systems (UMTS) licenses should have played a role here.[11]

As discussed above, we use two different estimations methods: IV with different fixed effects before and after Maastricht, and GMM.

[Insert Tables 1 and 2]

GP found a significant change in discretionary policy from "procyclical before [... to ...] essentially acyclical after Maastricht"(GP, p.550). The comparable IV-estimates with fixed effects in Table 1 show no significant change.[12] This indicates that the data revision had an impact on the estimation of the fiscal rule. On the other hand, the more efficient GMM-estimation results indicate a significant change, consistent with GP.

Comparing the results of Tables 1 and 2 also suggests that discretionary fiscal policy has become more procyclical in recent years. That is, when we extend the

[9] A quick inspection of the data shows that OECD potential output is similar to a trend obtained by applying a Hodrick-Prescott filter with standard λ parameters ($\lambda = 400$ for yearly data).

[10] Even earlier data is subject to revisions in case the previous data turns out to be unreliable or authorities change their statistical calculation methods. The former reason is most pronounced in the revision of Greece's debt and deficit, whereas the latter is present in the revision of GDP figures. These revisions can be quite large, e.g., in the case of Greece, the debt GDP/ratio for 2001 is 32 percentage points larger in OECD (2006) than in OECD (2002). Also, for Italy it is 12 percentage points higher, whereas it is 7 percentage points lower for Spain, both for 2001. That earlier data is also revised is illustrated by the observation that the Netherlands' debt/GDP ratio is 15 percentage points higher in 1982 in OECD (2006) than in OECD (2002). For most countries, revisions took place, although they are different in magnitude.

[11] Koen and van den Noord (2005) discussed how these sales are reflected in a "one-off" improvement in the general government financial balance, equal to the total amount of the disposal and recorded at the time the license is allocated. In 2000, UMTS revenues accounted for 1.08 per cent of GDP in the Euro Area, with 2.5 per cent of GDP in Germany, 1.2 per cent of GDP in Italy, and 0.7 per cent of GDP in the Netherlands. We checked whether a dummy variable for 2000 had a significant impact on the results. It turned out that this was not the case for the discretionary deficit (although it was the case for the non-discretionary one).

[12] Whereas we find for $a_1 = 0.221$ (0.052) and 0.096 (0.076) before and after Maastricht, respectively, with a p-value of 0.178 – cf Table 1 above, GP found $a_1 = 0.17$ (0.05) and -0.08 (0.08), respectively, with a p-value of 0.01 – cf their Table 3.

estimation period to 2004, Table 2 shows quite different results using both estimation methods. For the GMM-estimates: the marked increase in the coefficient a_1^{AM} after Maastricht signals that discretionary fiscal policy remains clearly procyclical after Maastricht, and the coefficient becomes marginally significant. Using the IV method, a_1^{AM} becomes significantly positive when extending the estimation period. Both findings, using more recent data, contradict the results found by GP.

As for the effect of past debt and deficits, all the results in Tables 1 and 2 show that these have a significant impact with the expected signs. Similar to GP, a large debt in the past has a mitigating impact on discretionary deficits, whereas a large past deficit has a positive impact. There are no significant differences before and after Maastricht.

We compare in Table 2A IV-estimates with various restrictions on the fixed-effect coefficients.[13] From the results presented in the table one observes a marked decrease of the estimated value of a_1^{AM} when we include a fixed country effect (comparing the Pooled IV with the Fixed Effect IV estimation). Next, when we allow for the fixed effect to be different before and after Maastricht, the estimated value of a_1^{AM} increases again. This suggests that countries have reacted differently to a gap in their discretionary policy after the Treaty, even when controlling for the impact of past debt and deficits.

The finding of country heterogeneity is widely observed in the more recent literature, e.g., de Haan et al. (2003), von Hagen (2003), Annett (2006), and Hallerberg et al. (2007). In the context of our panel analysis, a typical way to deal with this country heterogeneity consists of introducing variables capturing relevant political factors influencing the budgetary process. Following Annett (2006), we therefore include in the panel analysis three political variables: a dummy variable for the election year, a dummy variable for commitment or mixed forms of fiscal governance (when using fiscal contracts and/or numerical targets), and a dummy variable for delegation (the extent to which the fiscal authority is under political pressure). It turns out that the delegation dummy does not provide extra information in our data set relative to the distinction before and after Maastricht, and might also lead to a multicollinearity problem. Therefore, we decide not use that variable in our analysis. As can be seen from Table 2B,

[13] Dummy variables are not included; as in Arellano Bover (1995) variables are expressed in orthogonal deviations.

the commitment dummy does not have a significant influence. On the contrary, the election dummy turns out to be significant and we therefore include that in our estimation results. As the last two columns of both Tables 1 and 2 show, elections have a positive impact on the budget deficit before Maastricht, as might be expected from the political business cycle theory. However, the impact is absent in the period after Maastricht. Surprisingly, the inclusion of the political variables in our analysis does not modify our previous results. We therefore explore country heterogeneity in more detail in section 3 below.

[Insert Table 3]

From Table 3, one sees that the results for non-discretionary fiscal policy are quite clear. Whatever the estimation method, a significant increase in the counter-cyclical behaviour of this type of fiscal policy after Maastricht is found. Since similar results are found when we estimate for the period until 2002, we do not present these results separately. This confirms the finding of GP that automatic stabilizers took a more important role after the fiscal arrangements induced by the EMU. It is also interesting to observe that neither country specific effects nor election dummies had a large impact. This is consistent with the interpretation of non-discretionary policy as truly representing automatic stabilizers.

Finally, we have also reproduced all estimations presented in Tables 2 and 3 for the period 1980 – 2006, using the most recent data, which will certainly be revised for the years 2005-6 (for that reason, they are not presented separately). The new estimations show the same tendencies as reported above for the discretionary deficit. For the non-discretionary deficit, all coefficients are almost identical to the results reported in Table 3.

While the findings on non-discretionary policy are quite robust and consistent with prior notions, the findings on discretionary policy are more volatile, both with respect to the estimation period and with respect to the restrictions imposed. However, two general observations can be made. First, a changing behaviour of the discretionary fiscal policy with respect to the output gap before and after Maastricht is rejected. That is, contrary to the findings of GP we find that discretionary fiscal policy has remained procyclical.

Moreover, we have strong indications that discretionary fiscal policy has become more procyclical in recent years. A second observation is that we have strong indications that countries reacted differently to the Maastricht Treaty in the implementation of their fiscal policy, even after controlling for past debts, deficits, and the political business cycle.

3 Have discretionary and non-discretionary fiscal policies changed since Maastricht? A large vs. small country dimension

We have argued above that among the 11 European countries being considered, some countries exhibit heterogeneous behaviour. This might imply that our panel analysis leads to an average of country-specific fiscal rules that have little in common. To investigate this possibility, we estimate the fiscal rule for each individual country.[14] To keep the endogeneity bias under control, we use the IV-method with dummies before and after Maastricht to estimate the individual equations.

[Insert Table 4]

Table 4 summarizes the results of the estimation of these individual fiscal rules for the period 1980 – 2004. It turns out that the output gap only has a significant effect on discretionary policy after Maastricht for 5 countries: France, Germany, Greece, Italy, and Portugal, which all have consistently procyclical behaviour. Austria, Belgium, and Finland show a counter-cyclical discretionary fiscal policy, although the impact of the output gap does not differ significantly from zero.[15]

The non-discretionary fiscal policy exhibits a homogenous picture for all countries; it is significantly counter-cyclical, as can be seen from Table 4. This result again stresses the importance of automatic stabilizers in the fiscal stabilization policy and corroborates our conclusion from Section 2. However, from Table 4 one also sees that for none of the countries is the impact of the output gap on the non-discretionary deficit

[14] Note that estimation of the fiscal rule for individual countries leads to a small sample bias, i.e., 24 observations for the whole sample. Nevertheless, it gives an indication of the implementation of the fiscal rule at the country level. Following GP, we do not distinguish between before and after Maastricht for the coefficients of lagged debt and deficit in individual countries, in order to limit the number of parameters to be estimated. For that reason, we also ignore election dummies here.

[15] Unpublished results show that the discretionary fiscal policy is more procyclical for most countries when including the years 2003 and 2004 in the post-Maastricht sample, supporting our conclusion from Section 2 of a stronger destabilizing role of the discretionary fiscal policy.

significantly different before and after the Maastricht treaty (except Finland and Portugal). This finding is inconsistent with the IV estimates reported in Table 3 above.

[Insert Table 5]

A closer look at the data shows that for both Finland and Portugal the output gap behaves in an opposite way in comparison to other European countries. In the case of Finland, Braconnier and Holden (1999) showed that the crisis affecting Scandinavian countries in the early 1990s led to exceptionally fast growth of the public sector expenditures as a share of GDP. For Portugal, Pina (2007) stressed that, contrary to most European countries, primary spending has been strongly procyclical because of the fast growing activity in the 1990s. Such a catch up process has constituted an obstacle to fiscal consolidation ex-post. Finally, with respect to Greece, data revision did lead to some quite serious changes to correct for incorrect information that Greece presented when entering the EMU. We therefore further ignore Finland, Greece, and Portugal in our analysis.

In panel A of Table 5, we show how excluding these three outliers from the estimation results affects the estimation results for the EMU-11. The GMM results are quite stable to the exclusion of outliers. However, the post-Maastricht IV-estimates do change.

The procyclical behaviour of France, Germany, and Italy, and the insignificant, albeit sometimes counter-cyclical behaviour, of Austria, Belgium, Ireland, and the Netherlands, indicate the direction of a more systematic investigation of country heterogeneity in discretionary policy. Various studies have pointed out the possibility that small countries will stick much closer to the rules of the Stability and Growth Pact than large countries, e.g., de Haan et al. (2003), von Hagen (2003) and Annett (2006); see Buti and Pench (2004) and Kostoris Padoa Schioppa (2006) for a survey. This warrants taking the large countries in the EU from our sample as a group (France, Germany, Italy, and Spain) whose behaviour is compared to the small countries (Austria, Belgium, Ireland, and the Netherlands). Moreover, employing both the GMM estimator and the fixed effect IV estimator enables us to check the robustness of the estimations and allows for heterogeneity in the explanatory variables before and after Maastricht.

Observe from panel B in Table 5 that the large countries had a significant procyclical discretionary fiscal policy before Maastricht, which became more significantly procyclical thereafter, whereas the small countries had a significant procyclical policy before Maastricht, but acyclical thereafter. This is consistent with the notion that small countries will stick closer the MT-rules, but it does not explain why the large countries should follow a procyclical policy.

A possible explanation for the latter observation was given in von Hagen (2006), who distinguished between countries following two different institutional approaches: the delegation approach and the contractual approach. This was further elaborated in Hallerberg et al. (2007), where the large countries are generally characterised by the delegation approach and small ideological distances in ruling parties. Hallerberg et al. (2007: 354) then concluded that "Political business cycles are significant only for low ideological distance states... [which] makes intuitive sense and is compatible with [other] findings..."[16] This conclusion is consistent with our finding of a pro-cyclical discretionary policy for the large countries.

A quite different interpretation of the situation was provided by Kostoris Padoa Schioppa (2006), who emphasised that it is important to distinguish between demand and supply shocks to understand this phenomenon. We further analyse that view in the next section.

4 Have discretionary and non-discretionary fiscal policies changed since Maastricht? Decomposing supply and demand constraints

In search of a different impact of the output gap on the deficit for various countries, we look at the different components of the output gap. Business cycle fluctuations can either take their origins in constraints affecting the supply or the demand side. In our view, an asymmetric pattern of fiscal policy can be expected in both types of constraints. For instance, Calmfors *et al.* (2003, p.50) stated that, in the short run "there is no reason... to believe that the automatic stabilisers give an optimal degree of stabilisation... [On the contrary] if there are permanent supply shocks, the automatic stabilisers tend to prolong the adjustment process and cause budget effects that must ultimately be eliminated

[16] "Coalition governments in competitive party systems probably find it harder to agree on a fiscal expansion during election years, since it may not benefit all parties equally. For one-party governments, such distributional aspects do not arise" (*ibid.* p. 354).

through discretionary action". See also Beetsma and Jensen (2004), who emphasized that the effectiveness of a common fiscal policy rule for several countries with imperfectly correlated supply shocks depends on the extent to which products are close substitutes. A different argument was brought forward by Kostoris Padoa Schioppa (2006), who, in line with Uhlig (2003), emphasized that demand shocks affect inflation indirectly through the output gap, while supply shocks affect inflation directly. This implies that the European Central Bank will react directly to supply shocks (in particular occurring in large countries) and indirectly to demand shocks. Since the EMU countries will take the reaction by the ECB into account when deciding on fiscal policy, demand and supply shocks will have an asymmetric impact, in particular in large countries.

The demand and supply indicators are constructed from disaggregated data of the European Commission's Business and Consumer Survey, EU (2006).[17] We focus on Question 8 in the Industry / Business Climate Indicator (BCI) part, which asks companies to record the most important factor limiting their production. There are six possible answers (financial, demand, labour, equipment, other, or none), which are reported in the dataset by the percentage of total firms selecting this choice. We identify the answers 'demand' and 'financial' with demand constraints and 'labour' and 'equipment' with supply constraints.[18] Hence, it is possible to construct two indicators by simply adding up the shares of the firms answering 'demand' and 'financial' to define the demand constraint (D_t) and similarly, for the shares answering 'labour' and 'equipment' for the supply constraint (S_t). The shares answering 'none' and 'other' form the last category, 'no constraint'. A higher value for each constraint indicates that the constraint is more prevalent. Demand and supply variables have a quarterly frequency, but have been annualized using an arithmetic average, and cover the period 1985 to 2004 for all countries of our sample, except Austria and Finland for which no data were available.[19] Demand and supply variables are presented in Figure 1.

[17] Inflation is an alternative proxy to indicate supply pressures. However, it is not clear whether only supply shocks are measured, since demand shocks affect inflation indirectly (Kostoris Padoa Schioppa, 2006).
[18] The inclusion of financial constraints under demand constraints follows from the notion that credit rationing constrains demand (Van der Ploeg, 2005). However, including financial constraints under the category "other constraints" does not affect our results since only a small proportion of firms are involved.
[19] The data on Austria starts only in 1996:Q1 and on Finland in 1995:Q4. Portugal and Spain are included, although data are missing for 1985 and 1986.

[Insert Figure 1]

From Figure 1, one sees that demand (resp. supply) constraints typically follow the cycle in a counter-cyclical (resp. procyclical) way. That is, a negative output gap should be associated with a high incidence of demand constraints together with a low incidence of supply constraints, and a positive output gap induces the opposite case.[20] However, the correlation with the output gap is not very high, which indicates that demand and supply constraints contain different information than the output gap. We note that survey questions yield somewhat different data on capacity utilization than the output gap, which is a construct after all; this is illustrated in Appendix B for Germany in the early 1990s, see in particular Figure B.2. But more importantly, changes in demand and supply constraints give an indication of the intensity of demand and supply shocks that are much harder to observe from changes in the output gap. We elaborate this when discussing the estimation results in Table 6 below.

Another observation from Figure 1 is that there is a difference in the shares of firms reporting demand and supply constraints over countries. For instance, in Germany, on average 40 per cent of the firms indicate having demand constraints, while only 5 percent on average reports supply constraints. In France, the corresponding shares are 25 and 30 percent, respectively. Different reporting behaviour across countries will, however, not affect our estimation results, since they are captured by the fixed effects.

Finally, inspection of Figure 1 indicates to us that supply and demand variables are significantly inversely correlated.

The (discretionary or non-discretionary) fiscal rule can be expressed in terms of demand (D_t) and supply (S_t) constraints, instead of the output gap variable (gap_t). This is expressed in equation (5):

$$a_1^X.E_{t-1}(gap_{i,t}) = a_{1D}^X.E_{t-1}(D_{i,t}) + a_{1S}^X.E_{t-1}(S_{i,t}) \qquad X = AM, BM \qquad (5)$$

[20] In Appendix C we show that fixed effect estimation of the output gap on demand and supply constraints yields results with the expected signs – see Table C.1. Moreover, correlations between the constraints and the output gap exist for individual countries, which of course have the expected signs as well – see Table C.2.

As a consequence, the equations to be estimated follow from substituting equation (5) into equations (3) and (4).[21] Since a demand constraint should be associated with a negative output gap, and a supply constraint should be associated with a positive output gap, one might expect the same sign for a_1 and a_{1S}, and an opposite sign for a_{1D}.

The estimation results are presented for discretionary and non-discretionary policies in panel A of Tables 6 and 7. To allow for a fair comparison with previous results, we present in the first line of both tables the results of estimating the output gap (gap_t).

Comparing Table 6 with Table 2 shows that omitting Austria and Finland results in an increase in the estimated impact of the output gap on discretionary policy for the post-Maastricht period. Since the shorter sample period, starting in 1985 instead of 1980, can hardly be held responsible for differences in the post-Maastricht results, the smaller sample of countries should be held responsible. However, the results for the non-discretionary policy barely change when omitting Austria and Finland, as can be seen from Tables 3 and 7. These observations emphasize the heterogeneity of country reactions in the case of discretionary policy, which we also found in the previous section.

[Insert Tables 6 and 7]

Looking first at the case of discretionary policy, the estimation results in panel A of Table 6 indicate that using GMM and IV one consistently finds that discretionary policy does not seem to react to supply and demand constraints. No significant impact is found; only a significant result for supply constraints can be observed in case of IV after Maastricht. However, we already concluded from our inspection of Figure 1 that supply and demand constraints are strongly correlated, hence estimating an equation containing both of them will probably lead to a multicollinearity bias. We therefore also estimate equations (3) and (4) separately with the demand and the supply constraint alone. These results are presented in panel B of both tables.

[21] The category 'no constraint', which makes up for the full one hundred per cent of the output gap, is a default and is included in the constant term. This allows us to ignore the large differences in reported 'no constraints' over countries; the category 'other' is negligibly small. Kostoris Padoa Schioppa (2006) overcame this problem by looking at the ratio D_t/S_t, but this ratio shows a highly volatile pattern, since D_t and S_t usually move in opposite directions.

From panel B of Table 6, one sees that the impact of both demand and supply constraints, when estimated separately, is significant according to the IV-estimations after Maastricht. These results are also found, albeit less significant, when using the GMM estimators. The observed pro-cyclical reaction of discretionary fiscal policy to demand constraints implies a fiscal contraction when facing these constraints. In addition, the IV results show a highly significant procyclical impact of supply constraints after Maastricht. One also sees that in the period after Maastricht, supply constraints have a much stronger impact than demand constraints. This indicates an asymmetric reaction to demand and supply shocks.

To elaborate the latter point, we have also estimated equation (3) while distinguishing between two values for the output gap, one during the upswing and one during the downswing; see also Fonseca Marinheira (2005).[22] When interpreting these results, one should realise that the number of non-zero observations for both variables is relatively small in the pre-Maastricht period, which makes the results less reliable. However, from Panel C in Table 6 one can see that the IV estimation results are highly significant. The gap variable has a much stronger impact during a downswing, reinforcing the conclusion of asymmetry. Surprisingly, such a significant impact is not found from the GMM estimator, nor is the asymmetry. In particular, the IV-estimations are consistent with Fonseca Marinheira (2005), who found an asymmetric impact of procyclical policy and concluded: "Thus, in general, discretionary fiscal policy is procyclical in upswings and counter-cyclical in downswings" (p.9).

When comparing the results in panel C with those of panel B, we find that both estimations, when significant, indicate asymmetries after Maastricht in the reaction to demand and supply constraints, or upswings and downswings. The reaction to supply constraints or downswings is stronger. An interesting feature is that one should realise that both demand and supply constraints react to downswings (and upswings).[23] During a downswing, supply constraints will become stronger and demand constraints less strong.

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[22] An alternative found in the literature is to distinguish between a positive and a negative output gap. However, as can be seen from the estimation results presented in panel D of Table 6, this yields poor estimation results.

[23] The fixed effects estimation of the output gap on demand and supply constraints shows no stronger impact of the supply constraints on the output gap compared to the impact of demand constraints, see Table C.1 in Appendix C.

Therefore, the asymmetric impact of demand and supply constraints provides additional information on the asymmetric impact of upswings and downswings. We leave this as a matter for further research, but conclude that including demand and supply constraints in the analysis yields significant estimation results and interesting additional information.

Turning to non-discretionary policy, panel A in Table 7 shows that the impact of supply constraints is consistently negative whenever significant. Also, both GMM and IV indicate that supply constraints have a significantly stronger impact after Maastricht. However, the impact of demand constraints is less clear; the IV-estimation results are consistent with predictions, i.e., it has a positive impact, whereas GMM yields insignificant results.

When estimating the effects separately, panel B of Table 7 shows that in the case of non-discretionary policy, all results are consistent with expectations; the impact of demand and supply constraints is consistently positive and negative, respectively, for both GMM and IV. In both panels A and B, the supply constraints have a significantly stronger impact after Maastricht, both compared to the pre-Maastricht period and compared to the impact of demand constraints. This is a similar asymmetry as found with the discretionary budget policy. Interestingly, this asymmetry is not found when we estimate the impact of the output gap when distinguishing between upswings and downswings, as can be seen from panel C of Table 7. That is, we observe a stronger impact of the automatic stabiliser after Maastricht, as also appears from the first line of Table 7. However, the output gap does not have a stronger impact during downswings, contrary to what we found for the case of discretionary policy. We include a further analysis of these results in our agenda for further research, and turn to the quest of country heterogeneity, which was the original motivation for the analysis of the impact of demand and supply constraints.

[Insert Tables 8 and 9]

When considering country heterogeneity in discretionary policy we distinguish again between large and small countries, as in section 3. First we show, in Panel A of Tables 8

and 9, that ignoring the outliers – in this case Greece and Portugal – does not significantly affect the estimation results.

When focussing on large countries – cf. panel B of Tables 8 and 9 – both demand and supply constraints are significant after Maastricht in the IV-estimations. In addition, the results indicate a significant decrease in the impact of demand constraints compared to the period before Maastricht, and they further indicate a significant increase in the impact of supply constraints. In particular, for the supply constraints the pattern is much clearer for large countries than for all countries taken together. Moreover, the asymmetry in the reaction to demand and supply constraints is slightly weaker for the large countries than for the total sample.

The results for small countries show no clear pattern. All results indicate no significant reaction to both demand and supply constraints, neither before nor after Maastricht.

The decomposition of the output gap in the demand and supply constraints illuminates that in general, the EMU9 countries have reacted in an asymmetric way to demand and supply shocks. The estimation results indicate that non-discretionary policy was more focused on reducing the deficit after Maastricht; the counter-cyclical reaction to supply constraints was stronger, both compared to the pre-Maastricht period and compared to the impact of demand constraints. Similar results were found for the procyclical discretionary policy. Again, supply constraints were found to have a much stronger impact than demand constraints in the period after Maastricht.

These results also shed more light on country heterogeneity in discretionary policy. Consistent with the results from the previous section, we find that procyclical discretionary policy is mainly present in large countries, and the results of this section show that procyclical policy is strongest during upswings, when supply constraints are more binding. The absence of reaction to these constraints in small countries, in contrast to large countries, is consistent with the prediction of Kostoris Padoa Schioppa (2006).

5 Conclusion

In evaluating the impact of the Maastricht Treaty on fiscal policy in the EMU countries, Galí and Perotti (2003) found that the automatic stabilisers were more effective in counter-cyclical stabilisation after the implementation of the Treaty, while the procyclical stance of discretionary fiscal policy before Maastricht turned to an acyclical stance thereafter. From these findings, Galí and Perotti concluded that the fiscal rules implied by Maastricht (and by the Stability and Growth Pact) do not imply an unnecessary and harmful straight jacket for fiscal policy in the EMU countries.

Using an extended sample size and revised data, this paper casts some light on this optimistic finding of Galí and Perotti. We show that the procyclical behaviour of the fiscal discretionary policy has not disappeared with the Maatricht Treaty, but instead it persisted and was even amplified in recent years. Such a result stresses that the fiscal arrangements that followed the Maastricht Treaty indeed tied the hands of European governments in their implementation of stabilizing discretionary fiscal policy.

This conclusion corroborates the result of Fatás and Mihov (2003a), who attributed it to a 'fatigue effect'. They illustrated this by presenting two trends over the period 1991 – 2001. In their Figure 4, they portrayed the average value of change in the cyclically adjusted budget of the Euro countries. The decline of this value over the period 1991 – 1999 indicates "a trend towards smaller changes in discretionary policy. ...[However], since 1999, this measure of discretionary fiscal policy is picking up again. In other words, in 2000 and 2001 governments deviated more from their cyclically adjusted budget positions than in previous years" (p. 122); this is indicative of the fatigue effect: "Once countries have moved into the safe area below the 3 percent limit, the pressure to continue towards the goal of close to balance or surplus is much weaker and it shows in the data"(p. 121). Similar observations were made by Fatás and Mihov (2003a) from their Figure 8, in which they presented the standard deviation of change in the cyclically adjusted budget of the Euro countries. They found that the dispersion after a decreasing trend until 1999 also has higher values in 2000 and 2001.

[Insert Figures 2 and 3]

We reproduce both series for our sample for the period 1980 – 2006 in Figures 2 and 3.[24] The decline Fatás and Mihov (2003a) reported for the 1990s is also clearly visible in our data. However, this decline starts in the 1980s, as can be seen from our data, which contradicts Fatás and Mihov's focus on the 1990s and the Maastricht Treaty. Moreover, Figure 2 clearly illustrates the procyclical nature of discretionary policy, which we find consistently in our earlier analysis; it should be compared to the impact of the recessions in 1987, 1991, and 2001. The latter recession also illustrates that the interpretation by Fatás and Mihov (2003a) of the increased discretionary budget deficit in 2000 and 2001 is not due to a fatigue effect, but rather to the procyclical nature of discretionary policy. In particular, this is evident during upswings when the business cycle picks up again, and the discretionary deficit increases. Figure 3 clearly illustrates the country heterogeneity we report above; the larger spread during recessions illustrates the different reactions of large and small member states.

We show in Section 3 above that large countries have conducted stronger procyclical discretionary fiscal policy than small countries after the Maastricht Treaty, whereas their fiscal behaviour was similarly procyclical before the Treaty. These observations are confirmed by a strong positive reaction to supply constraints and a negative response to demand constraints for large countries after the Maastricht Treaty. In contrast, small countries showed no reaction. Since the reaction to supply constraints is stronger than to demand constraints, we observe an increasing discretionary deficit during the upswing, which confirms the finding of a procyclical discretionary fiscal reaction to the output gap. Note that the asymmetry in fiscal policy conduct is only present for the discretionary deficit. The automatic stabilizers work in a virtually identical manner in both large and small countries.

The economic stance appears as a key factor for the characterization of fiscal policy. In a recent paper, Manasse (2005) distinguished between "very good" and "very bad" economic times and "intermediate states". He then derived a simple model where limits on deficit output ratios lead to procyclical policies only in intermediate states, and to countercyclical policies in the other cases. Empirical investigations are now necessary to assess this idea, and these will constitute a promising area of future research. It will

[24] One should realize that Fatás and Mihov (2003a) used a different method to identify discretionary deficits than the OECD, based on the estimated residual of a government spending equation – see Fatás and Mihov (2003b).

nevertheless be necessary to overcome some technical problems, in particular those associated with the low number of observations (only few business cycles have been observed since 1992).

References

Annett, A. (2006). Enforcement and the Stability and Growth Pact: How Fiscal Policy Did and Did Not Change under Europe's Fiscal Framework, *Working Paper* 06/116, IMF.

Arellano, M. and O. Bover (1995), Another look at the instrumental variable estimation of error-components models, *Journal of Econometrics.*, 68 (1), 29-51.

Beetsma, R. and Jensen, H. (2004), Mark-up Fluctuations and Fiscal Policy Stabilization in a Monetary Union, *Journal of Macroeconomics.*, 26 (2), 357-376.

Braconnier and Holden (1999), The public budget balance – fiscal indicators and cyclical sensitivity in the Nordic countries, *National Institute of Economic Research Sweden.*

Buti, M. and L.R. Pench (2004), Why Do Large Countries Flout the Stability Pact? And What Can Be Done About It?, *Journal of Common Market Studies*, 42 (5), 1025-1032.

EU (2006), *European Commission's Business and Consumer Survey*, http://ec.europa.eu/economy_finance/indicators/businessandconsumersurveys_en.htm

Fatás, A. and Mihov, I. (2003a), On Constraining Fiscal Policy Discretion in EMU, *Oxford Review of Economic Policy*, 19 (1), 112-131.

Fatás A. and I. Mihov (2003b), The Case for Restricting Fiscal Policy Discretion, *The Quarterly Journal of Economics.*, 118 (4), 1419-1447.

Forni, L. and S. Momigliano (2004), Cyclical Sensitivity of Fiscal Policies Based on Real-Time Data, *Bank of Italy Economic Research Paper*, No. 540.

Galí, J. and R. Perotti (2003), Fiscal Policy and Monetary Integration in Europe, *Economic Policy*, 18 (37), 534-572.

Golinelli, R. and S. Momigliano (2006), Real-Time Determinants of Fiscal Policies in the Euro Area: Fiscal Rules, Cyclical Conditions and Elections, *Journal of Policy Modeling*, (28), 943-964.

De Haan, J., H. Berger and D. Jansen (2003), The End of the Stability and Growth Pact?, *CESIfo Working Paper*, No. 1093.

Hallerberg, M, R. Strauch and J. von Hagen (2007), The Design of Fiscal Rules and Forms of Governance in European Union Countries, *European Journal of Political Economy*, 23 (2), 338-359.

Kostoris Padoa Schioppa, F. (2006), The 2005 Reform of the Stability and Growth Pact: Too Little, Too Late?, *Bruges European Economic Research Papers*, No. 6.

Manasse, P, Deficit Limits, Budget Rules, and Fiscal Policy, *IMF Working Paper*, WP/05/120.

Fonseca Marinheiro, C. (2005), Has the Stability and Growth Pact Stabilised? Evidence from a Panel of 12 European Countries and some Implications for the Reform of the Pact., *CESIfo Working Paper*, No. 1411.

Hall, A. R. and A. Sen (1999), Structural stability testing in models estimated by Generalized Method of Moments, *Journal of Business and Economic Statistics.*, 17, 335-348.

Harris, N. and L. Matyas (2004), A comparative Analysis of Different IV and GMM estimators of dynamic Panel Data Models, *International Statistical Review*, 72(3), 397-408.

Koen and van den Noord (2005), Fiscal Gimmickry in Europe: One-off measures and creative accounting, *OECD Economics. Department Working Papers*, No. 417, OECD Publishing.

OECD (2002), *Economic Outlook Database Inventory*, EO72 December 2002 version, http://www.oecd.org/dataoecd/54/59/37380381.pdf.

OECD (2006), *Economic Outlook Database Inventory*, EO79 August 2006 version, http://www.oecd.org/dataoecd/54/59/37380381.pdf.
Ploeg van der, F. (2005), Back to Keynes?, *CESIfo Working Paper*, No. 1424.
Pina (2007), Fiscal Policy in Portugal: discipline, cyclicality and the scope for expenditure rules, presented at the Conference "Desenvolvimento Económico Português no Espaco Europeu".
Uhlig, H. (2003), One Money But Many Fiscal Policies in Europe: What Are the Consequences?, in Buti, M. (eds.), *Monetary and Fiscal Policies in EMU,* Cambridge, Cambridge University Press, 29-56.
Von Hagen, J. (2006), Fiscal Rules and Fiscal Performance in the EU and Japan, *GESY Discussion Paper,* No. 147.
Von Hagen, J. (2003), Fiscal Discipline and Growth in Euroland: Experiences With the Stability and Growth Pact, *ZEI Working Paper*, No. B06.
Wren-Lewis, S. (2000), The Limits to Discretionary Fiscal Stabilization Policy, *Oxford Review of Economic Policy*, 16 (4), 92-105.
Wyplosz, C. (2006), European Monetary Union: The Dark Side of a Major Success, *Economic Policy*, 21 (46), 208-261.

Appendix A: Data Sources

Source: OECD Economic Outlook 79 (June 2006)

- Primary Government Balance, Cyclically Adjusted,
- Primary Government Balance,
- Output Gap,
- Gross Government Debt.

Note: For Germany until 1990, the series for West-Germany was used and from 1991 onwards, data for Germany was used.

Data is available from 1979-2007, but for some countries the data is extended backward:

- Primary government balance - Ireland, the Netherlands and Spain (1979)
- Gross government debt - Ireland (1979-1997), Italy (1979-1994), Portugal (1979-1994), and Spain (1979-1989)

We extend gross government debt (d) using a linear transformation based on the ratio of old data to new for the first three years for which both are available. We calculate this ratio by $Rd = d^{new}_T / d^{old}_T + d^{new}_{T+1} / d^{old}_{T+1} + d^{new}_{T+2} / d^{old}_{T+2}$, where T is the first year where both debt figures are available. The data is extended back for t = {1979,.., T-1} by multiplying the old debt figures with the respective ratio ($d^{old}_t * Rd$). The "old" data are the data used by Galí and Perotti (2003). Primary government balance is estimated in a similar fashion for the single year 1979.

The cyclical part of the deficit is calculated by converting the primary government balance as a percentage of potential GDP by: Primary gov't balance*(100-output gap)/100 and subtracting the cyclically adjusted primary government balance from it. The differences are relatively small.

A detailed description of the data can be found in the OECD's Economic Outlook Database Inventory: http://www.oecd.org/dataoecd/54/59/37380381.pdf (EO79 August 2006 version).

Appendix B: Germany in the early 1990s

Looking at quarterly data, Figure B.1 shows that output increased strongly from 1991:4 until 1992:1, but decreased sharply from 1992:2 onwards. This is reflected in Figure B.2 by an initially high output gap and a strong fall later on, from 3.4 % in 1992:1 to -2.3% in 1993:2. Reported capacity utilisation by firms was initially high,[25] around 89% until 1991:3, and then dropped to 78.3% in 1993:3. It does not reflect the spike in the output gap 1991:4 – 1992:1, but follows its general development consistently. The boom around 1990 is characterised by both a high output gap, high capacity utilisation and low demand constraints as can be seen from Figures B.2 and B.3. Moreover, supply constraints are relatively high, which is as expected. Parallel to the sharp fall in GDP and capacity utilisation from 1991 onwards, a strongly increasing number of firms reported demand constraints and a decreasing number of firms reported supply constraints. The parallel to the development in capacity utilisation and demand constraints is highlighted in Figure B.4. From Figure 3 one sees how the supply constraints move in the opposite direction, as might be expected.

Figure B.1 Development of GDP

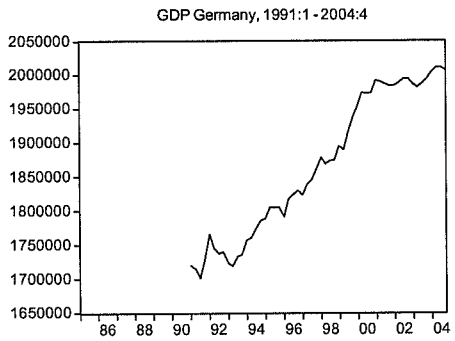


Figure B.2 Output gap and capacity utilisation

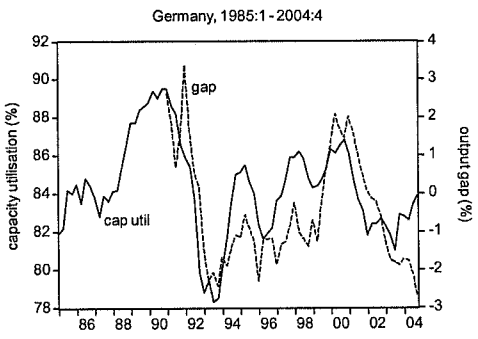


Figure B.3 Demand and supply constraints

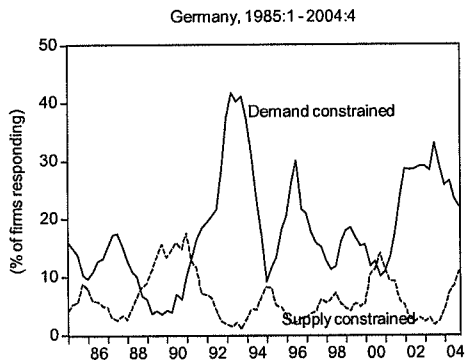
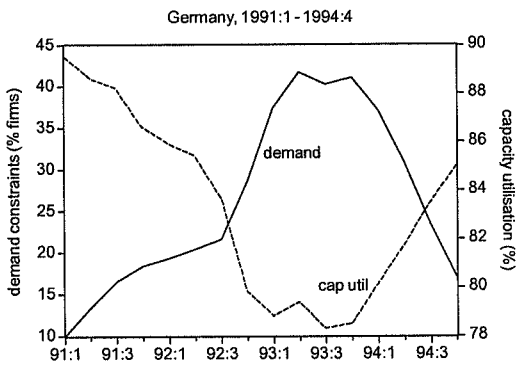


Figure B.4 Demand constraints and capacity utilisation



[25] This reported capacity utilisation stems from the same questionaire as that asking for the constraints, the European Commission's Business and Consumer Survey, EU (2006).

Appendix C: Correlation of Output Gap with Demand and Supply Constraints

Table C1: Fixed effects estimation, 1985 - 2004

	Both demand and supply	Only demand	Only supply
Demand	-0.064***	-0.072***	
	(0.014)	(0.012)	
Supply	0.030		0.092***
	(0.027)		(0.024)

Table C2: Individual countries, 1985 - 2004

	Correlation of output gap with	
Country	Demand constraints	Supply constraints
Belgium	-0.72	0.64
France	-0.63	0.68
Germany	-0.60	0.82
Greece	-0.31	0.12
Ireland	-0.58	0.25
Italy	-0.71	0.47
Netherlands	-0.70	0.83
Portugal	-0.08	0.19
Spain	-0.32	0.45

Table 1: Discretionary Fiscal Rule, EMU-11, 1980-2002

	GMM			IV, fixed effects BM and AM			GMM			IV, fixed effects BM and AM		
	BM	AM	test $a^{BM}=a^{AM}$ p-value	BM	AM	test $a^{BM}=a^{AM}$ p-value	BM	AM	test $a^{BM}=a^{AM}$ p-value	BM	AM	test $a^{BM}=a^{AM}$ p-value
output gap	0.221***	0.077		0.221***	0.096		0.233***	0.099		0.219***	0.099	
	(0.026)	(0.073)	0.012	(0.052)	(0.076)	0.178	(0.026)	(0.078)	0.039	(0.050)	(0.073)	0.179
lagged deficit	0.693***	0.669***		0.552***	0.643***		0.711***	0.702***		0.559***	0.638***	
	(0.077)	(0.115)	0.729	(0.058)	(0.077)	0.348	(0.063)	(0.122)	0.900	(0.056)	(0.074)	0.392
lagged debt	-0.029***	-0.033***		-0.057***	-0.036***		-0.023***	-0.024**		-0.055***	-0.036**	
	(0.009)	(0.010)	0.105	(0.010)	(0.013)	0.209	(0.009)	(0.009)	0.854	(0.010)	(0.012)	0.220
election							1.034**	-0.049		1.051***	0.238	
							(0.453)	(0.324)	0.094	(0.243)	(0.261)	0.024
Sargan			0.085						0.264			

Table 2: Discretionary Fiscal Rule, EMU-11, 1980-2004

	GMM			IV, fixed effects BM and AM			GMM			IV, fixed effects BM and AM		
	BM	AM	test $a^{BM}=a^{AM}$ p-value	BM	AM	test $a^{BM}=a^{AM}$ p-value	BM	AM	test $a^{BM}=a^{AM}$ p-value	BM	AM	test $a^{BM}=a^{AM}$ p-value
output gap	0.214***	0.111*		0.221***	0.152**		0.227***	0.130*		0.219***	0.154***	
	(0.026)	(0.066)	0.026	(0.051)	(0.065)	0.414	(0.026)	(0.070)	0.100	(0.050)	(0.063)	0.424
lagged deficit	0.711***	0.708***		0.552***	0.695***		0.728***	0.739***		0.559***	0.692***	
	(0.085)	(0.095)	0.967	(0.058)	(0.065)	0.103	(0.074)	(0.105)	0.873	(0.056)	(0.063)	0.113
lagged debt	-0.022**	-0.026***		-0.057***	-0.018*		-0.018*	0.018*		-0.055***	-0.018*	
	(0.009)	(0.009)	0.196	(0.010)	(0.010)	0.009	(0.010)	(0.010)	0.894	(0.010)	(0.010)	0.008
election							1.153**	-0.043		1.051***	0.283	
							(0.489)	(0.357)	0.082	(0.241)	(0.238)	0.024
Sargan			0.092						0.316			

Note: Tables 1 and 2 refer to the discretionary fiscal rule $d^*_{i,t} = c_i^{BM} + c_i^{AM} + a_1^{BM}.E_{t-1}(gap_{i,t}) + a_1^{AM}.E_{t-1}(gap_{i,t}) + a_2^{BM}.d^*_{i,t-1} + a_2^{AM}.d^*_{i,t-1} + a_3^{BM}.b_{i,t-1} + a_3^{AM}.b_{i,t-1} + u_{i,t}$. Coefficients are reported as well as standard deviation between brackets. *, ** and *** imply significance at the 10%, 5% and 1% significance level respectively. Equality between a_1^{BM} and a_1^{AM} is tested by a standard F-test, whose p-value is indicated. For the GMM estimator, the instrument space is composed of the second and third lag of $d^*_{i,t}$ and the one-year lagged US output gap. The adequacy of this instrument space is tested with the Sargan test. The output gap is instrumented in the IV estimator by including the one-year lagged US output gap. In the last two estimates an election dummy is added.

Table 2A: Discretionary Fiscal Rule, EMU-11, 1980-2004, Sensitivity Fixed Effects

	IV, fixed effects BM and AM			IV, fixed effects (only one)			IV, pooled		
	BM	AM	test $a^{BM}=a^{AM}$ p-value	BM	AM	test $a^{BM}=a^{AM}$ p-value	BM	AM	test $a^{BM}=a^{AM}$ p-value
output gap	0.219***	0.154***		0.185***	0.104*		0.167***	0.163***	
	(0.050)	(0.063)	0.424	(0.050)	(0.060)	0.322	(0.049)	(0.054)	0.958
lagged deficit	0.559***	0.692***		0.734***	0.726***		0.819***	0.771***	
	(0.056)	(0.063)	0.113	(0.046)	(0.057)	0.908	(0.039)	(0.053)	0.457
lagged debt	-0.055***	-0.018*		-0.016***	-0.019***		-0.008**	-0.010***	
	(0.010)	(0.010)	0.008	(0.005)	(0.005)	0.345	(0.003)	(0.003)	0.637
election	1.051***	0.283		1.012***	0.295		1.029***	0.282	
	(0.241)	(0.238)	0.024	(0.246)	(0.245)	0.038	(0.248)	(0.247)	0.032

Table 2B: Discretionary Fiscal Rule, EMU-11, 1980-2004, Sensitivity Political Variables

	GMM			IV, fixed effects BM and AM			GMM			IV, fixed effects BM and AM		
	BM	AM	test $a^{BM}=a^{AM}$ p-value	BM	AM	test $a^{BM}=a^{AM}$ p-value	BM	AM	test $a^{BM}=a^{AM}$ p-value	BM	AM	test $a^{BM}=a^{AM}$ p-value
output gap	0.227***	0.130*		0.219***	0.154***		0.224***	0.092		0.222***	0.151**	
	(0.026)	(0.070)	0.100	(0.050)	(0.063)	0.424	(0.034)	(0.079)	0.100	(0.050)	(0.063)	0.379
lagged deficit	0.728***	0.739***		0.559***	0.692***		0.650***	0.696***		0.549***	0.693***	
	(0.074)	(0.105)	0.873	(0.056)	(0.063)	0.113	(0.112)	(0.090)	0.668	(0.057)	(0.063)	0.094
lagged debt	-0.018*	0.018*		-0.055***	-0.018*		-0.018	-0.023		-0.054***	-0.018*	
	(0.010)	(0.010)	0.894	(0.010)	(0.010)	0.008	(0.013)	(0.015)	0.074	(0.010)	(0.010)	0.012
election	1.153**	-0.043		1.051***	0.283		1.389***	0.108		1.031***	0.279	
	(0.489)	(0.357)	0.082	(0.241)	(0.238)	0.024	(0.472)	(0.381)	0.050	(0.243)	(0.238)	0.028
commitment							-1.269	-0.260		-0.360	-0.195	
							(0.958)	(0.325)	0.342	(0.495)	(0.464)	0.808
Sargan			0.316						0.603			

Table 3: Non-Discretionary Fiscal Rule, EMU-11, 1980-2004

	GMM			IV, fixed effects BM and AM			GMM			IV, fixed effects BM and AM		
	BM	AM	test $a^{BM}=a^{AM}$ p-value	BM	AM	test $a^{BM}=a^{AM}$ p-value	BM	AM	test $a^{BM}=a^{AM}$ p-value	BM	AM	test $a^{BM}=a^{AM}$ p-value
output gap	-0.380***	-0.502***		-0.346***	-0.515***		-0.380***	-0.505***		-0.346***	-0.515***	
	(0.042)	(0.027)	0.001	(0.022)	(0.016)	0.000	(0.042)	(0.027)	0.001	(0.022)	(0.016)	0.000
lagged deficit	0.131***	-0.028		0.199***	0.001		0.132***	-0.031		0.200***	0.001	
	(0.044)	(0.028)	0.016	(0.046)	(0.016)	0.000	(0.045)	(0.029)	0.016	(0.046)	(0.016)	0.000
lagged debt	-0.001	-0.002		-0.002	-0.002		-0.001	-0.002		-0.002	-0.002	
	(0.002)	(0.002)	0.149	(0.002)	(0.003)	0.919	(0.002)	(0.002)	0.058	(0.002)	(0.003)	0.908
election							-0.058	-0.056		0.016	0.035	
							(0.052)	(0.059)	0.976	(0.062)	(0.060)	0.821
Sargan			0.107						0.068			

Note: This table refers to the non-discretionary fiscal rule $(d_{i,t} - d^*_{i,t}) = c_i^{BM} + c_i^{AM} + a_1^{BM}.E_{t-1}(gap_{i,t}) + a_1^{AM}.E_{t-1}(gap_{i,t}) + a_2^{BM}.(d_{i,t} - d^*_{i,t}) + a_2^{AM}.(d_{i,t} - d^*_{i,t}) + a_3^{BM}.b_{i,t-1} + a_3^{AM}.b_{i,t-1} + u_{i,t}$. See also the note to Tables 1 and 2.

Table 4: EMU Individual Fiscal Rule 1980-2004

	Discretionary			Non-discretionary		
country	a_1^{BM}	a_1^{AM}	test $a_1^{BM}=a_1^{AM}$	a_1^{BM}	a_1^{AM}	test $a_1^{BM}=a_1^{AM}$
Austria	0.042	-0.172		-0.428***	-0.487***	
	(0.183)	(0.324)	0.552	(0.080)	(0.094)	0.305
Belgium	0.356	-0.482		-0.617***	-0.754***	
	(0.251)	(0.694)	0.253	(0.066)	(0.110)	0.233
Finland	0.162	-0.282		-0.417***	-0.620***	
	(0.362)	(0.206)	0.321	(0.096)	(0.092)	0.001
France	0.175	0.484*		-0.408***	-0.456***	
	(0.123)	(0.245)	0.291	(0.031)	(0.032)	0.153
Germany	0.450***	0.474**		-0.517***	-0.781***	
	(0.103)	(0.207)	0.918	(0.104)	(0.190)	0.142
Greece	0.088	1.173***		-0.345***	-0.352***	
	(0.377)	(0.352)	0.059	(0.043)	(0.036)	0.853
Ireland	0.748**	0.669		-0.450***	-0.346***	
	(0.341)	(0.452)	0.800	(0.041)	(0.033)	0.042
Italy	0.373*	0.567**		-0.428***	-0.483***	
	(0.207)	(0.256)	0.556	(0.059)	(0.069)	0.349
Netherlands	0.309	0.212		-0.484***	-0.470***	
	(0.179)	(0.252)	0.781	(0.045)	(0.046)	0.806
Portugal	0.371***	0.319**		-0.309***	-0.427***	
	(0.075)	(0.148)	0.739	(0.017)	(0.029)	0.000
Spain	0.097	0.017		-0.460***	-0.482***	
	(0.117)	(0.215)	0.762	(0.102)	(0.079)	0.648

Note: This table refers to the discretionary and non-discretionary fiscal rules $d^*_{i,t} = c_i^{BM} + c_i^{AM} + a_1^{BM}.E_{t-1}(gap_{i,t}) + a_1^{AM}.E_{t-1}(gap_{i,t}) + a_2^{BM}.d^*_{i,t-1} + a_2^{AM}.d^*_{i,t-1} + a_3^{BM}.b_{i,t-1} + a_3^{AM}.b_{i,t-1} + u_{i,t}$ and $(d_{i,t} - d^*_{i,t}) = c_i^{BM} + c_i^{AM} + a_1^{BM}.E_{t-1}(gap_{i,t}) + a_1^{AM}.E_{t-1}(gap_{i,t}) + a_2^{BM}.(d_{i,t} - d^*_{i,t}) + a_2^{AM}.(d_{i,t} - d^*_{i,t}) + a_3^{BM}.b_{i,t-1} + a_3^{AM}.b_{i,t-1} + u_{i,t}$. Coefficients are reported as well as standard deviation between brackets. *, ** and *** imply significance at the 10%, 5% and 1% significance level respectively. Equality between a_1^{BM} and a_1^{AM} is tested by a standard F-test, whose p-value is indicated. The output gap is instrumented in the IV estimator by including the one-year lagged US output gap.

Table 5: Country heterogeneity (output gap EMU11, 1980-2004)

	GMM				IV, fixed effects BM and AM		
Countries	a_1^{BM}	a_1^{AM}	test $a_1^{BM}=\varepsilon$	Sargan	a_1^{BM}	a_1^{AM}	test $a_1^{BM}=a_1^{AM}$
Panel A: EMU11 and outliers with election dummies							
EMU11	0.227***	0.130*			0.219***	0.154**	
	(0.026)	(0.070)	0.100	0.264	(0.050)	(0.063)	0.424
EMU11 (excl. FIN/GRC/PRT)	0.210***	0.159**			0.254***	0.303***	
	(0.023)	(0.077)	0.436	0.462	(0.054)	(0.094)	0.648
Panel B: Large vs. Small countries with election dummies							
DEU/ESP/FRA/ITA	0.186***	0.280***			0.253***	0.414***	
	(0.059)	(0.090)	0.179	0.273	(0.071)	(0.122)	0.259
AUT/BEL/IRE/NLD	0.198***	0.095			0.260***	0.227	
	(0.067)	(0.060)	0.214	0.143	(0.091)	(0.143)	0.844

Note: This table refers to the discretionary fiscal rule $d^*_{i,t} = c_i^{BM} + c_i^{AM} + a_1^{BM}.E_{t-1}(gap_{i,t}) + a_1^{AM}.E_{t-1}(gap_{i,t}) + a_2^{BM}.d^*_{i,t-1} + a_2^{AM}.d^*_{i,t-1} + a_3^{BM}.b_{i,t-1} + a_3^{AM}.b_{i,t-1} + u_{i,t}$, and election dummies. See also the note to Table 1. For the GMM specification BEL/IRE/NLD, the lagged US gap is excluded from the instrument space.

Table 6: Discretionary fiscal policy, EMU9 1986-2004

	GMM				IV		
	a_1^{BM}	a_1^{AM}	test $a_1^{BM}=a_1^{AM}$ p-value	Sargan p-value	a_1^{BM}	a_1^{AM}	test $a_1^{BM}=a_1^{AM}$ p-value
Output gap	0.233***	0.192**			0.228***	0.364***	
	(0.083)	(0.079)	0.734	0.253	(0.075)	(0.074)	0.195
Panel A: Demand and supply in (3) with election dummies							
Demand	-0.033	-0.013			0.006	0.001	
	(0.029)	(0.033)	0.292	0.498	(0.039)	(0.054)	0.941
Supply	0.027	0.064			0.096	0.223**	
	(0.060)	(0.080)	0.581	0.498	(0.092)	(0.107)	0.367
Panel B: Either demand or supply in (3) with election dummies							
Demand	-0.044*	-0.028*			-0.027	-0.101***	
	(0.023)	(0.015)	0.373	0.437	(0.019)	(0.033)	0.052
Supply	0.066	0.098**			0.077	0.221***	
	(0.047)	(0.046)	0.619	0.463	(0.049)	(0.065)	0.079
Panel C: Upswing and downswing gap in (3) with election dummies							
Gap_up	0.339***	0.115			0.282***	0.290***	
	(0.098)	(0.087)	0.139	0.231	(0.098)	(0.092)	0.952
Gap_down	-0.076	0.246			0.280	0.450***	
	(0.375)	(0.171)	0.483	0.231	(0.231)	(0.091)	0.499
Panel D: Positive and negative gap in (3) with election dummies							
Gap_pos	0.371**	0.306*			0.455	0.074	
	(0.186)	(0.171)	0.829	0.231	(0.321)	(0.200)	0.317
Gap_neg	0.116	0.123			0.031	0.474***	
	(0.205)	(0.173)	0.982	0.231	(0.268)	(0.156)	0.155

Note: This table refers to the discretionary fiscal rule $d^*_{i,t} = c_i^{BM} + c_i^{AM} + a_1^{BM}.E_{t-1}(gap_{i,t}) + a_1^{AM}.E_{t-1}(gap_{i,t}) + a_2^{BM}.d^*_{i,t-1} + a_2^{AM}.d^*_{i,t-1} + a_3^{BM}.b_{i,t-1} + a_3^{AM}.b_{i,t-1} + u_{i,t}$, with election dummies. See also the note to Table 1.

Table 7: Non-discretionary fiscal policy, EMU9 1986-2004

	GMM				IV		
	a_1^{BM}	a_1^{AM}	test $a_1^{BM}=a_1^{AM}$ p-value	Sargan p-value	a_1^{BM}	a_1^{AM}	test $a_1^{BM}=a_1^{AM}$ p-value
Output gap	-0.343***	-0.495***			-0.301***	-0.521***	
	(0.031)	(0.039)	0.000	0.117	(0.048)	(0.023)	0.000
Panel A: Demand and supply in (4) with election dummies							
Demand	0.010	0.016			0.030	0.095**	
	(0.016)	(0.018)	0.818	0.276	(0.020)	(0.038)	0.127
Supply	-0.101	-0.187**			0.005	-0.166**	
	(0.063)	(0.079)	0.009	0.276	(0.050)	(0.074)	0.058
Panel B: Either demand or supply in (4) with election dummies							
Demand	0.047***	0.052***			0.029*	0.176***	
	(0.012)	(0.010)	0.696	0.000	(0.016)	(0.029)	0.000
Supply	-0.127	-0.203**			-0.063	-0.327***	
	(0.079)	(0.082)	0.015	0.479	(0.038)	(0.049)	0.000
Panel C: Upswing and downswing gap in (4) with election dummies							
Gap_up	-0.276***	-0.525***			-0.441***	-0.453***	
	(0.069)	(0.043)	0.002	0.018	(0.124)	(0.071)	0.937
Gap_down	-0.166***	-0.476***			-0.215***	-0.568***	
	(0.062)	(0.045)	0.000	0.018	(0.079)	(0.057)	0.000

Note: This table refers to the non-discretionary fiscal rule $d_{i,t} - d^*_{i,t} = c_i^{BM} + c_i^{AM} + a_1^{BM}.E_{t-1}(gap_{i,t}) + a_1^{AM}.E_{t-1}(gap_{i,t}) + a_2^{BM}.(d_{i,t} - d^*_{i,t}) + a_2^{AM}.(d_{i,t} - d^*_{i,t}) + a_3^{BM}.b_{i,t-1} + a_3^{AM}.b_{i,t-1} + u_{i,t}$, with election dummies. See also the note to Table 1.

Table 8: Discretionary fiscal rule, 1985-2004, Demand constraints

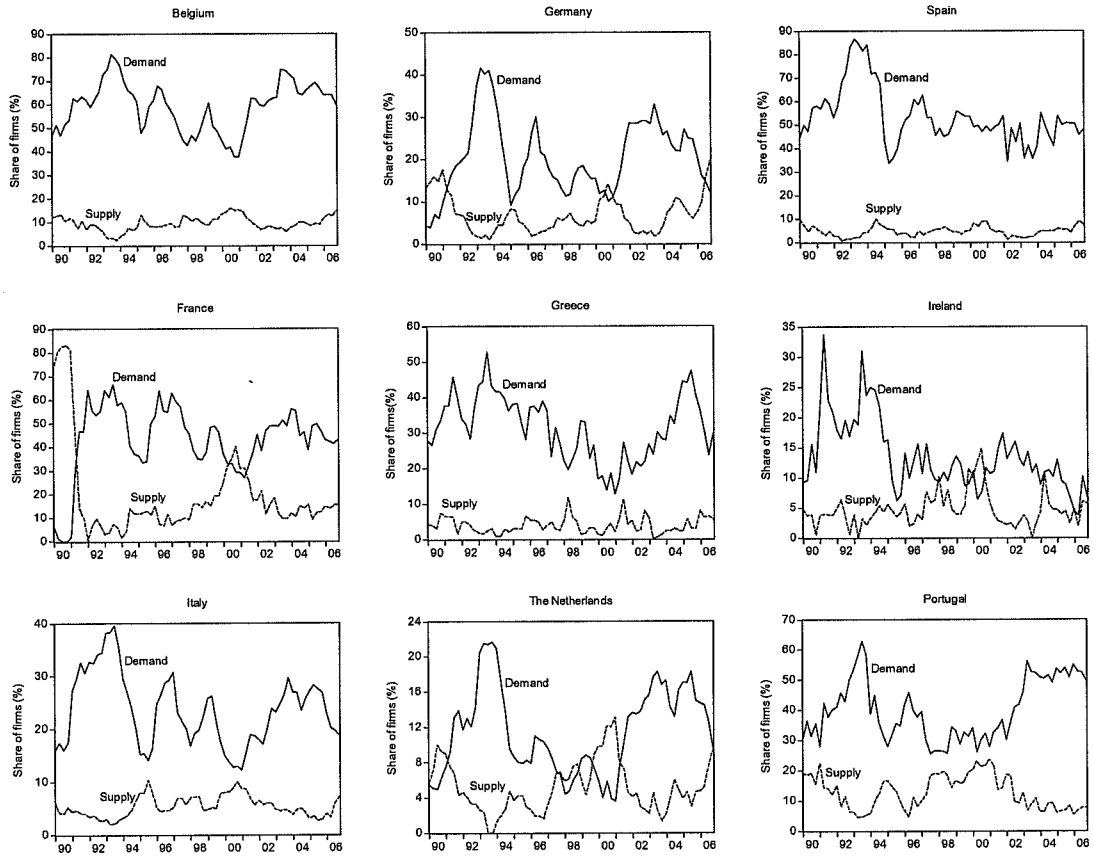
	GMM				IV, fixed effects BM and AM		
Countries	a_1^{BM}	a_1^{AM}	test $a_1^{BM}=a_1^{AM}$	Sargan	a_1^{BM}	a_1^{AM}	test $a_1^{BM}=a_1^{AM}$
Panel A: EMU9 and outliers with election dummies							
EMU9	-0.044*	-0.028*			-0.027	-0.101***	
	(0.023)	(0.015)	0.373	0.437	(0.019)	(0.033)	0.052
EMU9 (excl. GRC&PRT)	-0.039**	-0.022**			-0.022	-0.097**	
	(0.018)	(0.011)	0.179	0.500	(0.017)	(0.036)	0.125
Panel B: Large vs. Small countries with election dummies							
DEU/ESP/FRA/ITA	-0.025***	-0.008			-0.019	-0.140*	
	(0.005)	(0.014)	0.043	0.534	(0.020)	(0.070)	0.105
BEL/IRE/NLD	-0.002	0.005			-0.022	0.017	
	(0.013)	(0.016)	0.392	0.217	(0.038)	(0.086)	0.683

Table 9: Discretionary fiscal rule, 1985-2004, Supply constraints

	GMM				IV, fixed effects BM and AM		
Countries	a_1^{BM}	a_1^{AM}	test $a_1^{BM}=a_1^{AM}$	Sargan	a_1^{BM}	a_1^{AM}	test $a_1^{BM}=a_1^{AM}$
Panel A: EMU9 and outliers with election dummies							
EMU9	0.066	0.098**			0.077	0.221***	
	(0.047)	(0.046)	0.619	0.463	(0.049)	(0.065)	0.079
EMU9 (excl. GRC&PRT)	0.047	0.070			0.052	0.218***	
	(0.033)	(0.063)	0.714	0.310	(0.036)	(0.072)	0.041
Panel B: Large vs. Small countries with election dummies							
DEU/ESP/FRA/ITA	0.004	0.088*			0.043	0.210***	
	(0.018)	(0.044)	0.006	0.414	(0.029)	(0.076)	0.044
BEL/IRE/NLD	0.240	-0.110			-0.005	0.099	
	(0.180)	(0.129)	0.028	0.532	(0.254)	(0.200)	0.751

Note: Table 8 refers to the discretionary fiscal rule $d^*_{i,t} = c_i^{BM} + c_i^{AM} + a_1^{BM}.E_{t-1}(demand_{i,t}) + a_1^{AM}.E_{t-1}(demand_{i,t}) + a_2^{BM}.d^*_{i,t-1} + a_2^{AM}.d^*_{i,t-1} + a_3^{BM}.b_{i,t-1} + a_3^{AM}.b_{i,t-1} + u_{i,t}$ and Table 9 refers to $d^*_{i,t} = c_i^{BM} + c_i^{AM} + a_1^{BM}.E_{t-1}(supply_{i,t}) + a_1^{AM}.E_{t-1}(supply_{i,t}) + a_2^{BM}.d^*_{i,t-1} + a_2^{AM}.d^*_{i,t-1} + a_3^{BM}.b_{i,t-1} + a_3^{AM}.b_{i,t-1} + u_{i,t}$, both including election dummies. See also the note to Table 1. For the GMM specification BEL/IRE/NLD, the lagged US gap is excluded from the instrument space. The output gap is instrumented in the IV estimator by including the one-year lagged US output gap.

Figure 1: Demand and Supply Indicators



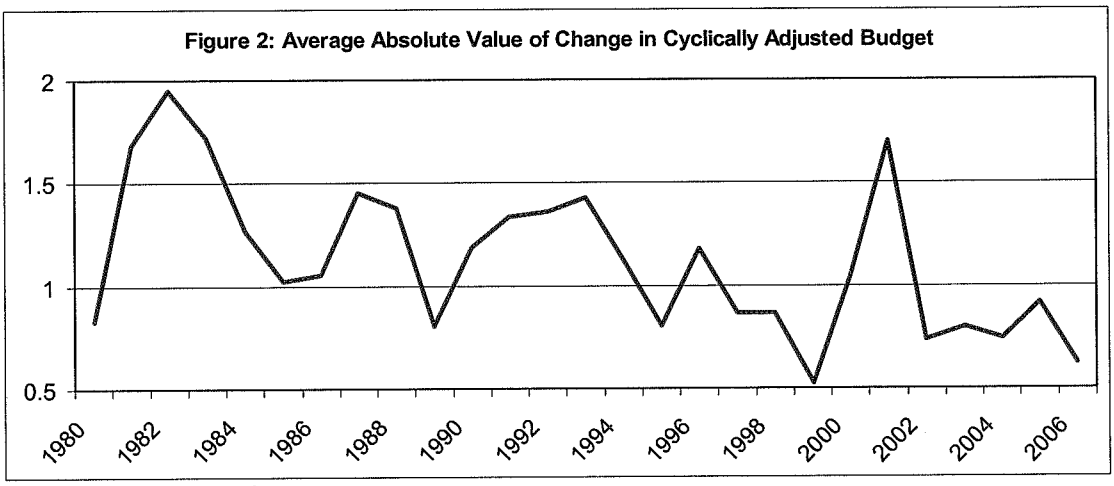


Figure 2: Average Absolute Value of Change in Cyclically Adjusted Budget
2
1.5
1
0.5
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006

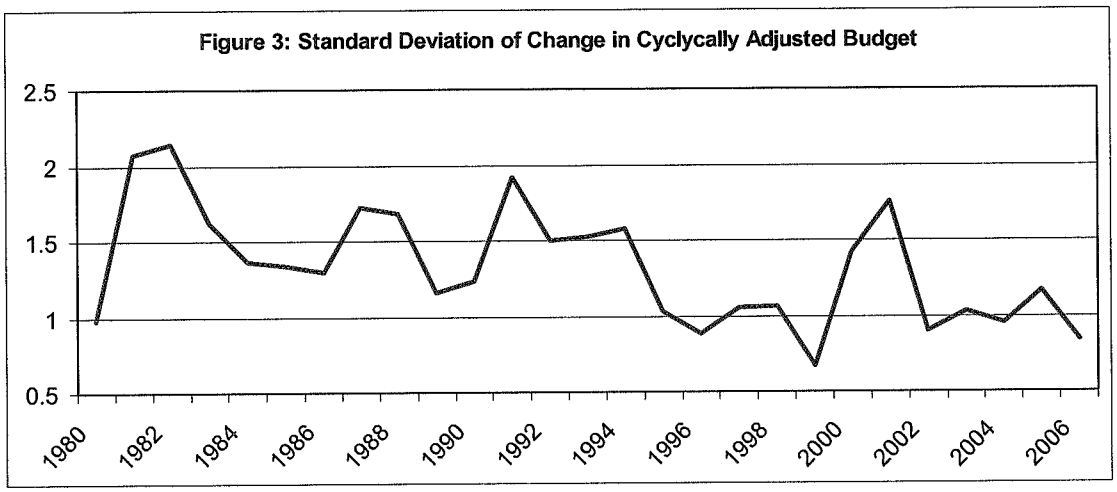


Figure 3: Standard Deviation of Change in Cyclycally Adjusted Budget
2.5
2
1.5
1
0.5
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006